WE CLAIM:

1. A disk drive comprising:

(a) a disk comprising a plurality of tracks;

(b) a head;

(c) a voice coil motor (VCM) for actuating the head over the disk;

(d) a command queue for storing a plurality of disk access commands; and

(e) a disk controller for executing a rotational position optimization (RPO) algorithm to select a disk access command from the command queue as the next command to execute relative to an estimated seek time required to seek the head to a target track for each command in the command queue, wherein:

the disk controller estimates a motor capability of the VCM by measuring a velocity of the VCM relative to a current flowing through the VCM;

the disk controller modifies the estimated seek time for each command in the command queue in response to the estimated motor capability; and

the disk controller executes the RPO algorithm using the modified estimated seek times.

2. The disk drive as recited in claim 1, wherein the disk controller determines the estimated motor capability during an acceleration phase of the VCM.

3. The disk drive as recited in claim 1, wherein the disk controller determines the estimated motor capability during a deceleration phase of the VCM.

4. The disk drive as recited in claim 2, wherein the disk controller determines the estimated motor capability of the VCM by computing a ratio of a difference in an estimated velocity of the VCM to a difference in an expected velocity of the VCM over a predetermined time interval of the acceleration phase.

5. The disk drive as recited in claim 4, wherein the difference in the expected velocity of the VCM is determined by integrating a current flowing through the VCM.

6. The disk drive as recited in claim 5, further comprising a current detector for detecting the current flowing through the VCM.

7. The disk drive as recited in claim 5, wherein the current flowing through the VCM is estimated by applying a near-saturated acceleration current to the VCM during the acceleration phase.

8. The disk drive as recited in claim 1, wherein the disk controller determines the estimated motor capability of the VCM by:

(a) applying an acceleration current to the VCM during the acceleration phase, wherein the acceleration current is significantly less than a saturation current; and

(b) measuring a distance traveled by the VCM over a predetermined time interval.

9. The disk drive as recited in claim 1, wherein the disk controller decreases the estimated seek time for each command in the command queue if the estimated motor capability increases.

10. The disk drive as recited in claim 1, wherein the disk controller increases the estimated seek time for each command in the command queue if the estimated motor capability decreases.

11. The disk drive as recited in claim 1, wherein the disk controller modifies the estimated seek time for each command in the command queue in response to the estimated motor capability and a seek distance for each command in the command queue.

12. The disk drive as recited in claim 11, wherein the disk controller modifies the estimated seek time for each command in the command queue by:

(a) computing a seek time delta in response to the estimated motor capability and the seek distance; and

(b) adding the seek time delta to a nominal estimated seek time.

13. The disk drive as recited in claim 12, wherein the disk controller modifies the estimated seek time for each command in the command queue according to:

$$est\_st = est\_st_0 + k*D(st(L))/D(a)*da$$

where:

st(L) is a seek time as a function of the seek distance L;

est_st_0 is the nominal estimated seek time;

a is the estimated motor capability;

a_0 is a nominal motor capability;

da is the difference between a and a_0; and

k is a discounting scalar.

14. A method of executing a rotational position optimization (RPO) algorithm in a disk drive for selecting a disk access command from a command queue as the next command to execute relative to an estimated seek time required to seek a head to a target track of a disk for each command in the command queue, wherein a voice coil motor (VCM) actuates the head over the disk, the method comprising the steps of:

(a) estimating a motor capability of the VCM by measuring a velocity of the VCM relative to a current flowing through the VCM;

(b) modifying the estimated seek time for each command in the command queue in response to the estimated motor capability; and

(c) executing the RPO algorithm using the modified estimated seek times.

15. The method as recited in claim 14, wherein the motor capability is estimtaed during an acceleration phase of the VCM.

16. The method as recited in claim 14, wherein the motor capability is estimated during a deceleration phase of the VCM.

17. The method as recited in claim 15, wherein the step of estimating the motor capability of the VCM comprises the step of computing a ratio of a difference in an estimated velocity of the VCM to a difference in an expected velocity of the VCM over a predetermined time interval of the acceleration phase.

18. The method as recited in claim 17, wherein the difference in the expected velocity of the VCM is determined by integrating a current flowing through the VCM.

19. The method as recited in claim 17, further comprising the step of detecting the current flowing through the VCM.

20. The method as recited in claim 17, further comprising the step of estimating the current flowing through the VCM by applying a near-saturated acceleration current to the VCM during the acceleration phase.

21. The method as recited in claim 14, wherein the step of estimating the motor capability of the VCM comprises the steps of:

(a) applying an acceleration current to the VCM during the acceleration phase, wherein the acceleration current is significantly less than a saturation current; and

(b) measuring a distance traveled by the VCM over a predetermined time interval.

22. The method as recited in claim 14, wherein the estimated seek time for each command in the command queue is decreased if the estimated motor capability increases.

23. The method as recited in claim 14, wherein the estimated seek time for each command in the command queue is increased if the estimated motor capability decreases.

24. The method as recited in claim 14, further comprising the step of modifying the estimated seek time for each command in the command queue in response to the estimated motor capability and a seek distance for each command in the command queue.

25. The method as recited in claim 24, wherein the step of modifying the estimated seek time for each command in the command queue comprises the steps of:

(a) computing a seek time delta in response to the estimated motor capability and the seek distance ; and

(b) adding the seek time delta to a nominal estimated seek time.

26. The method as recited in claim 25, wherein the estimated seek time for each command in the command queue is modified according to:

$$est\_st = est\_st_0 + k*D(st(L))/D(a)*da$$

where:

st(L) is a seek time as a function of the seek distance L;

est_st_0 is the nominal estimated seek time;

a is the estimated motor capability;

a_0 is a nominal motor capability;

da is the difference between a and a_0; and

k is a discounting scalar.